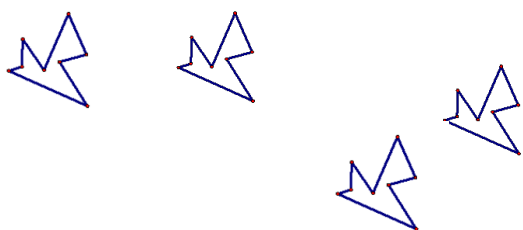


## Ch 9 (including 4.8 and 6.7) Properties of Transformations

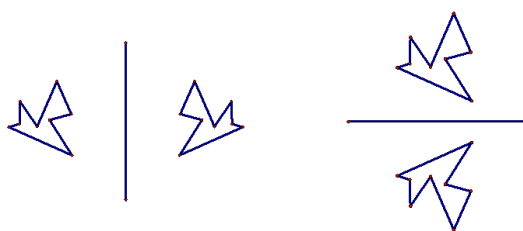
A transformation is an operation that moves or changes a geometric figure in some way to produce a new figure.

There are four main types of transformations: translations, reflections, rotations, and dilations.

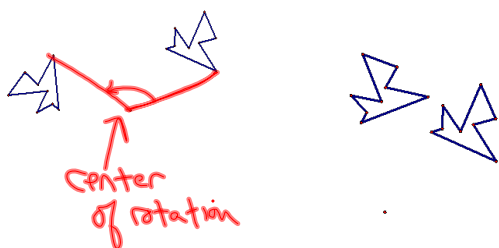
A **translation** is a transformation that slides a figure. It moves every point of a figure the same distance in the same direction.



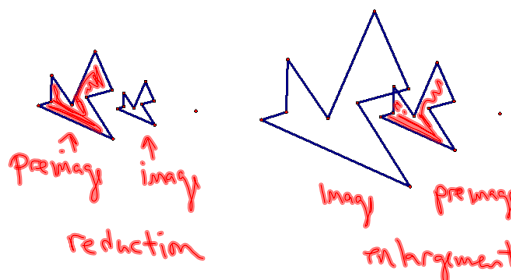
A **reflection** is a transformation that creates a mirror image. It flips the original across a line of reflection.



A **rotation** is a transformation that turns the original about a fixed point, known as the center of rotation.



A **dilation** is a transformation that stretches or shrinks a figure to create a similar one. It can be a reduction or an enlargement.



## Vocabulary

Original figure is known as the preimage.

The figure that is produced is known as the image.

A transformation that preserves length and angle measure is an isometry.

*ex translation, reflection, rotation*

Translations can be described using coordinates.

$$(x, y) \longrightarrow (x + a, y + b)$$

$$\text{Ex: } (x, y) \longrightarrow (x + 3, y - 2)$$

Translate the following points using the above translation.

$$A(4, 8) \rightarrow A'(7, 6)$$

"A prime"

$$B(-5, 3) \rightarrow B'(-2, 1)$$

$$C(2, -6) \rightarrow C'(5, -8)$$

—

Write the translation mapping:  $(7, 4) \longrightarrow (8, 10)$

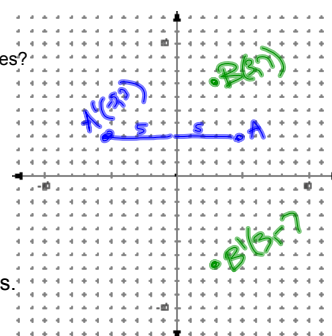
$$(x, y) \longrightarrow (x+1, y+6)$$

Let's look at reflections in the coordinate plane.  
Reflect the point A in the y-axis.

$$A(5, 3) \rightarrow A'(-5, 3)$$

What happened to the coordinates?

$$(x, y) \rightarrow (-x, y)$$



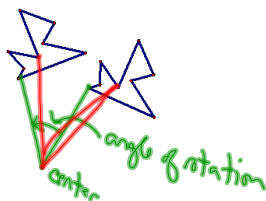
Reflect point B in the x-axis.

$$B(3, 7) \rightarrow B'(3, -7)$$

What happened to the coordinates?

$$(x, y) \rightarrow (x, -y)$$

Rotations can be clockwise or counterclockwise. The angle of rotation is formed by rays drawn from the center of rotations through corresponding points on the original figure and its image.

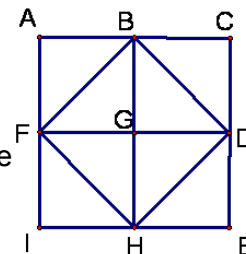


1.  $90^\circ$  counterclockwise rotation of H about G.

D

2.  $270^\circ$  counterclockwise rotation of D about G.

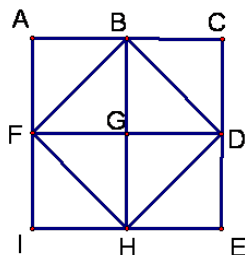
H



3.  $90^\circ$  clockwise rotation of  $\overline{FA}$  about G. BC

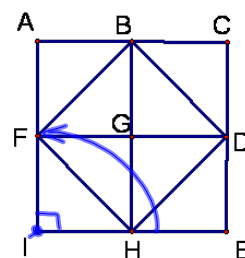
4.  $90^\circ$  clockwise rotation of  $\overline{FH}$  about G. BF

5.  $180^\circ$  rotation of  $\triangle BGD$  about G.  $\triangle FGH$



6.  $180^\circ$  rotation of  $\triangle FIH$  about G.  $\triangle DCB$

7.  $90^\circ$  counterclockwise rotation of  $\overline{EI}$  about I.  $\overline{AI}$



#### Dilations on the coordinate plane

Dilate the triangle by a ratio of 2.

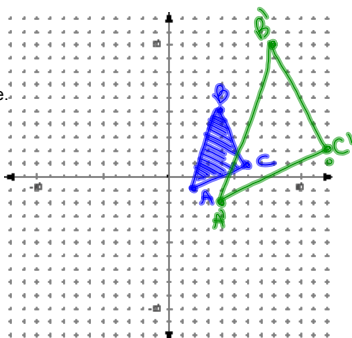
A (2, -1) A' (4, -2)

B (4, 5) B' (8, 10)

C (6, 1) C' (12, 2)

Graph the original and the image.

Primary



origin is the center of dilation

Scale factor = 2

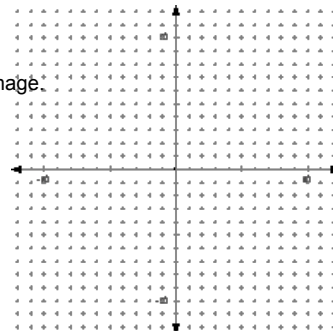
Dilate the triangle by a ratio of  $\frac{1}{2}$ .

A (-8, 2) A' ( )

B (-2, 6) B' ( )

C (4, 6) C' ( )

Graph the original and the image.



Dilate the triangle by a ratio of -3.

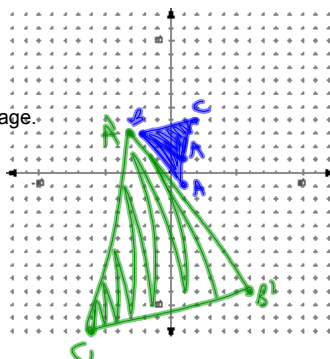
A (1, -1) A' (-3, 3)

B (-2, 3) B' (-6, -9)

C (2, 4) C' (-6, -12)

Graph the original and the image.

Primary



HW

p276-277

3-5, 9, 13, 17, 20, 33-36

p412-413

9-11, 16-18